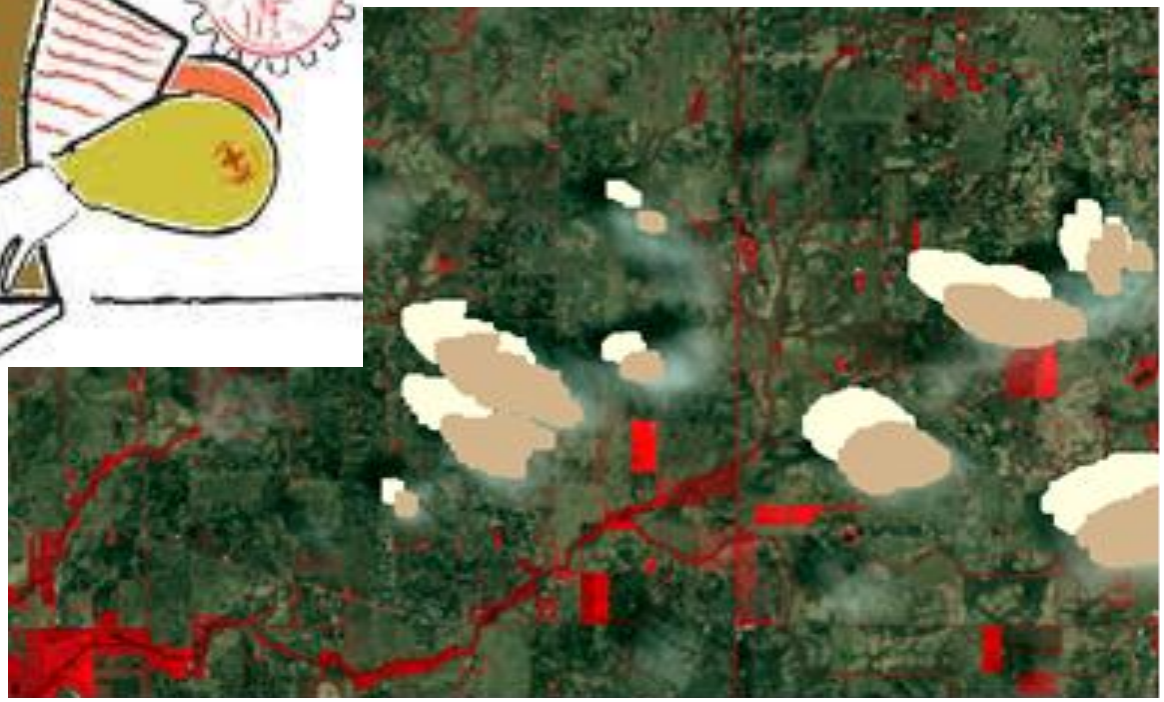
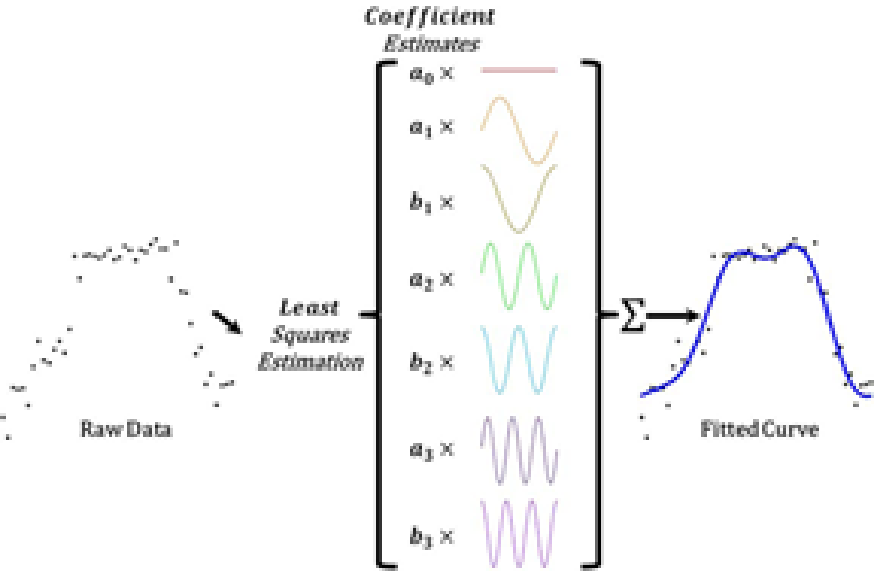
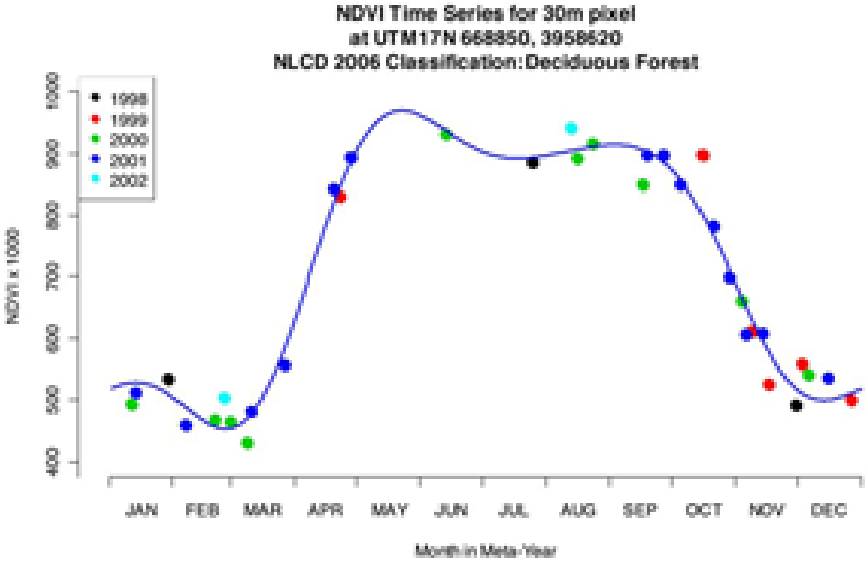
Making Multitemporal Work – Wynne et al.

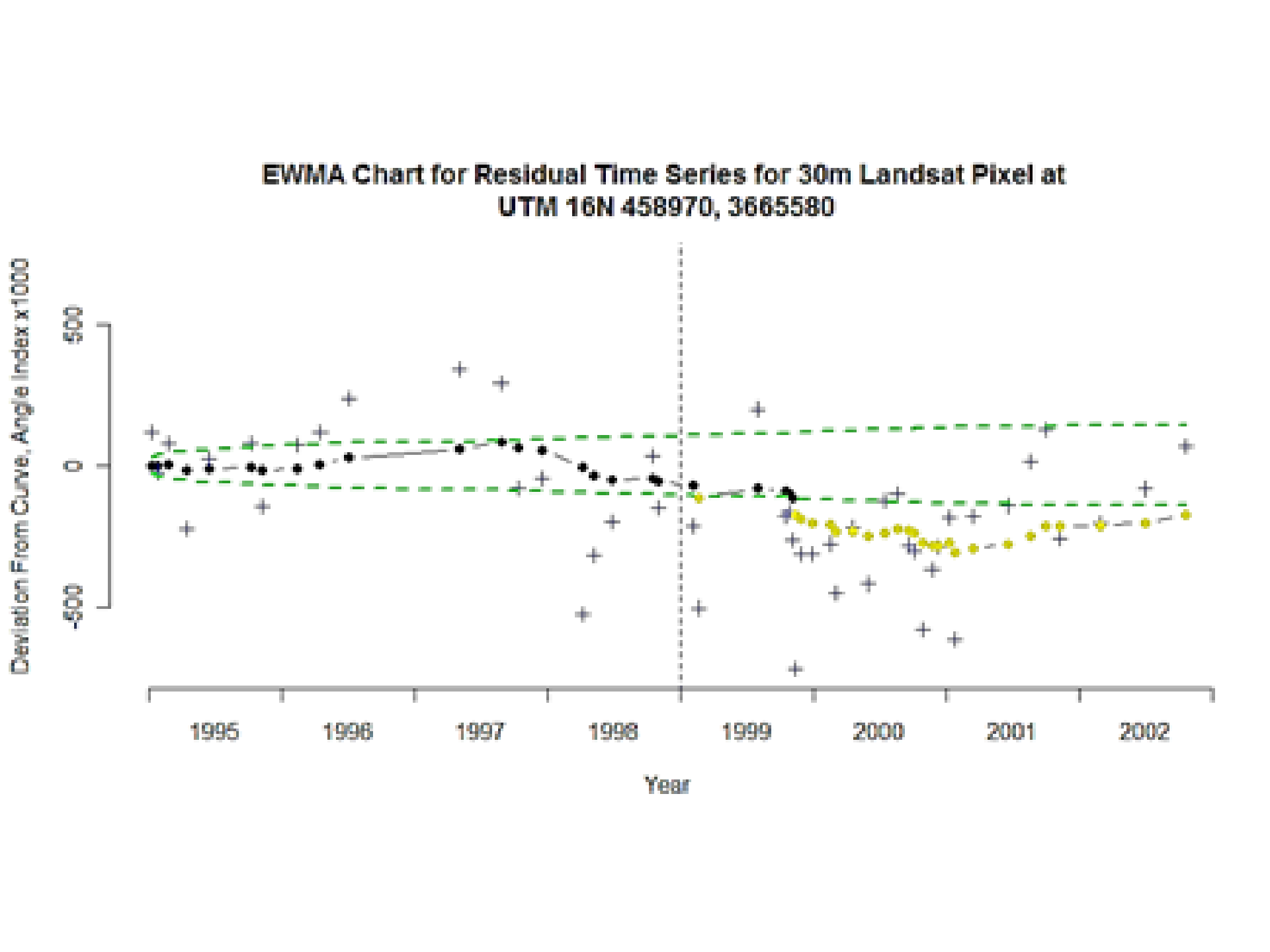
- Is crowd sourcing a reliable and cost-effective solution to removing clouds and cloud shadows that remain subsequent to the application of automated algorithms?
- How can Fourier series best be used to create smooth periodic time series of Landsat data?
- Using smooth periodic time series generated from Fourier regression or (as necessary) (E)STARFM (Gao et al. 2006, Zhu et al. 2010), how can both gross and subtle changes to land use / cover be detected reliably using from one to three additional observations?
- How well do empirical (Flores et al., 2006) and physically-based (Ganguly et al., 2012) algorithms for leaf area index (LAI) generation estimate LAI in intensively-managed pine ecosystems? How can they be improved?
- Can we improve the spatial specificity of regional forest productivity estimates via stratification of FIA data using temporally coherent clusters?
- Using the new tree canopy product as a case study, how can the precision of vegetation continuous field products be estimated in a robust and computationally-efficient manner?

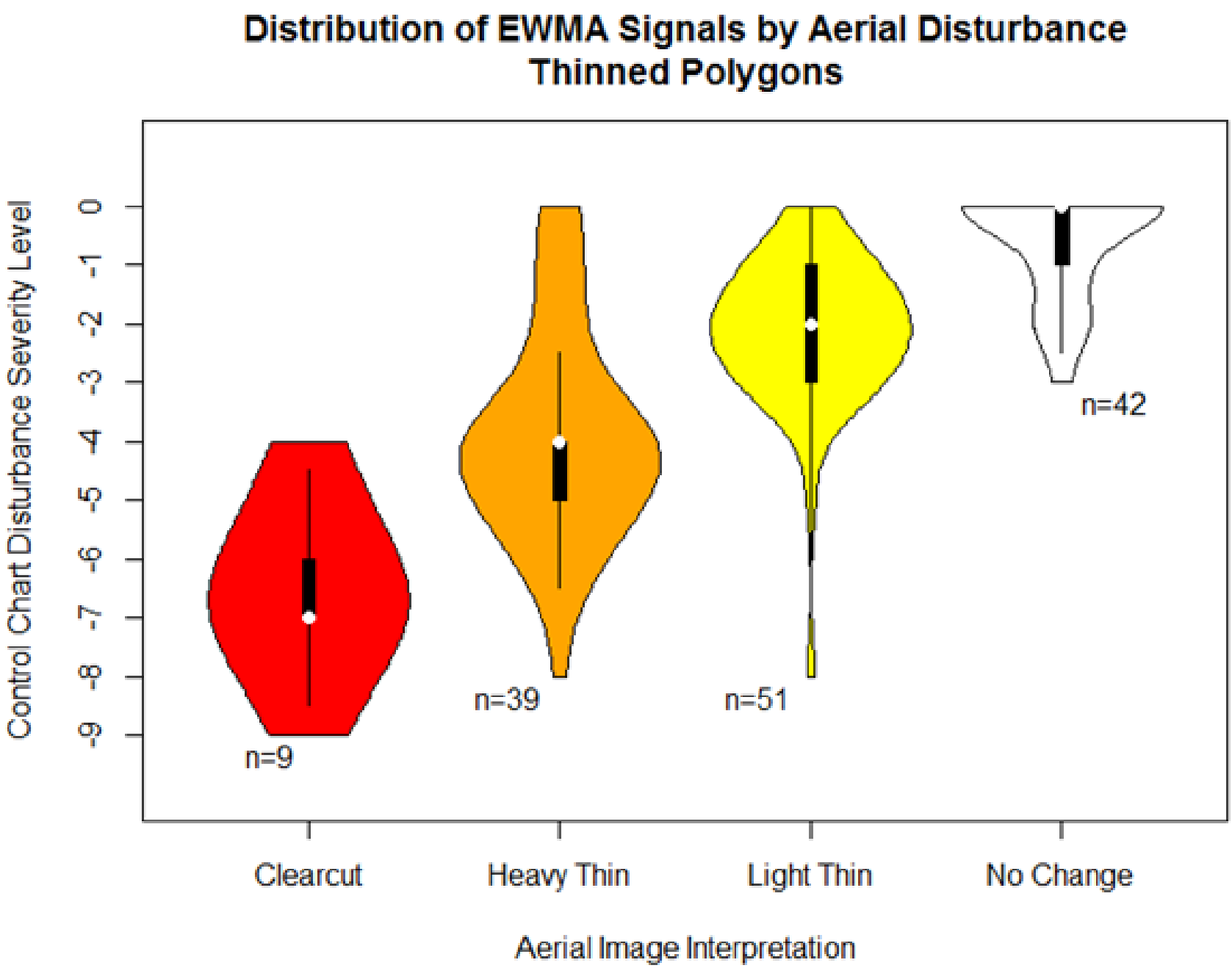

amazon.com

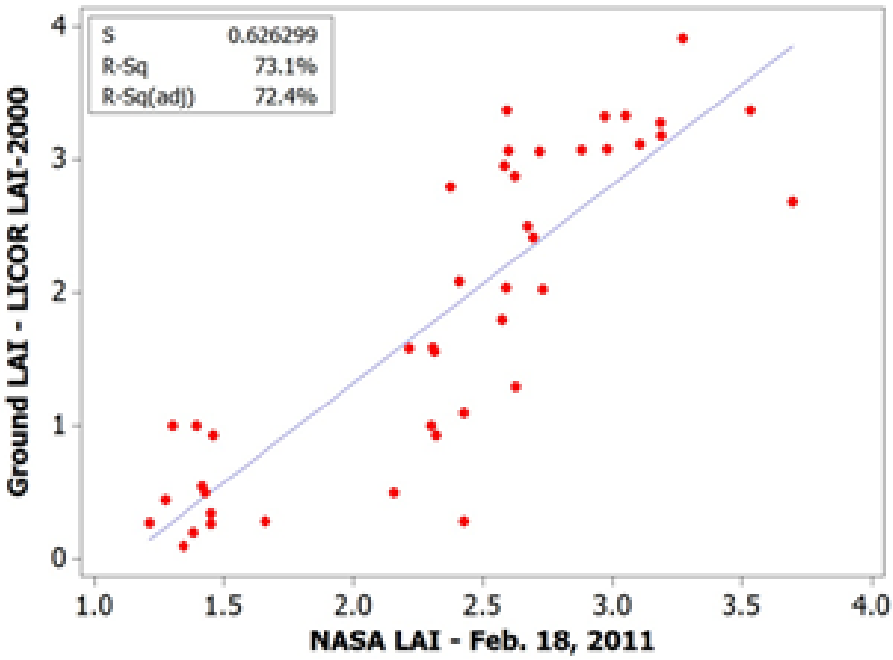


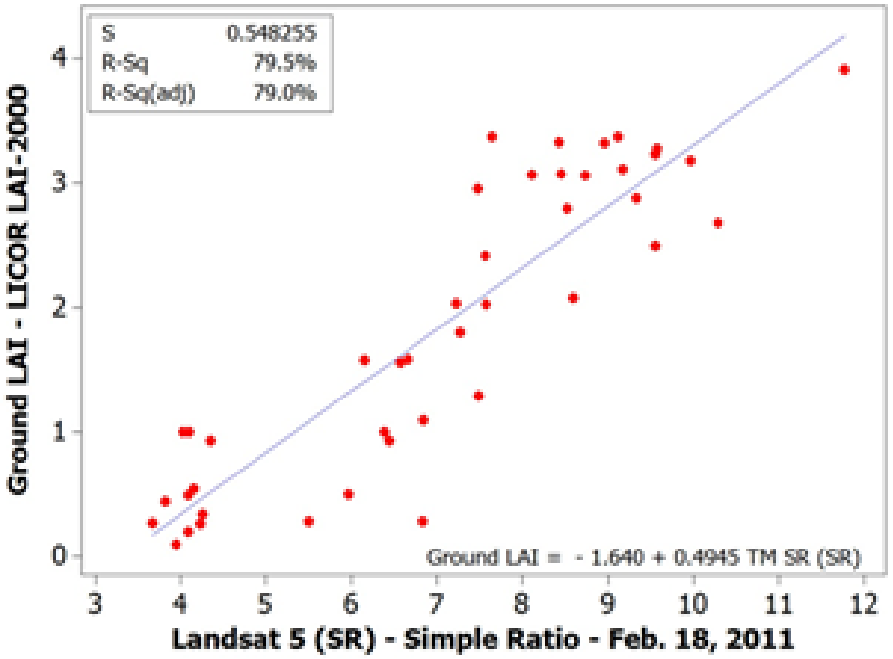

Coefficient
Estimates
$a_0 \times$
$a_1 \times$
$b_1 \times$
$a_2 \times$
$b_2 \times$
$a_3 \times$
$b_3 \times$
Least
Squares
Estimation
Raw Data
Σ
Fitted Curve

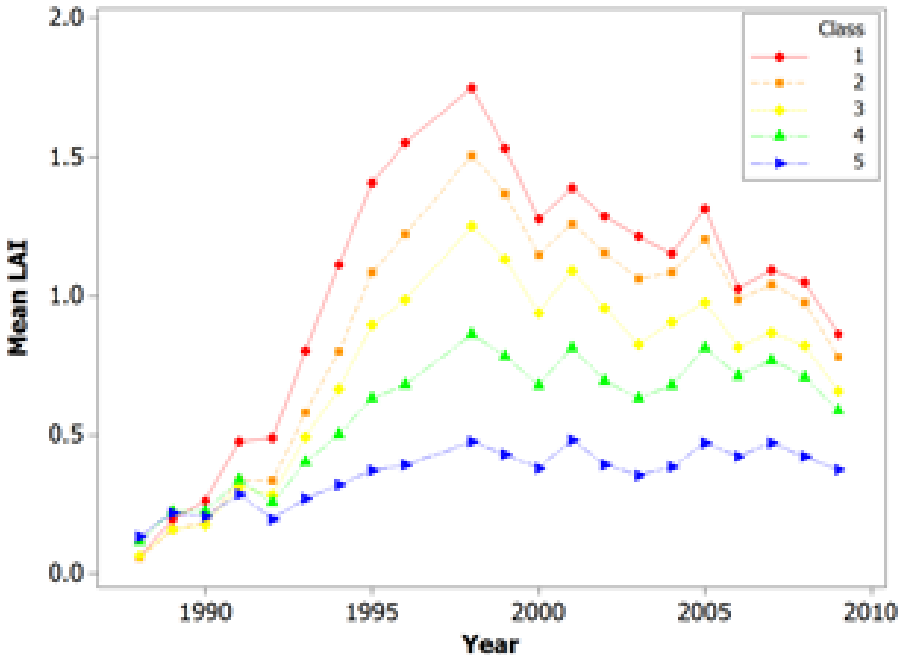

NDVI Time Series for 30m pixel
at UTM17N 668850, 3958520
NLCD 2006 Classification: Deciduous Forest
1998
1999
2000
2001
2002
NDVI x 1000
400
500
600
700
800
900
1000
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Month in Meta-Year

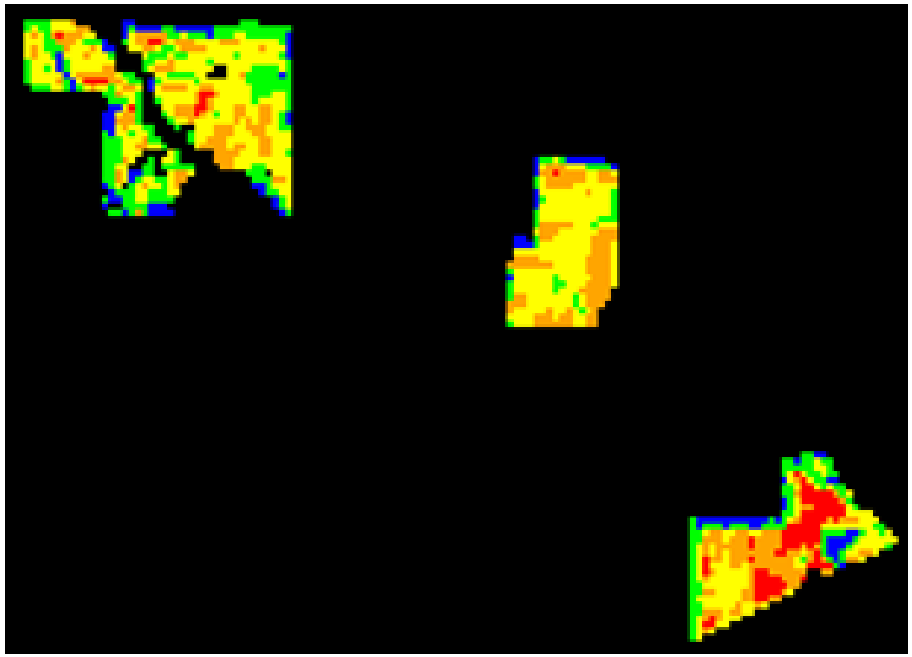

EWMA Chart for Residual Time Series for 30m Landsat Pixel at
UTM 16N 458970, 3665580
Deviation From Curve, Angle Index x1000
500
0
-500
1995
1996
1997
1998
1999
2000
2001
2002
Year


Distribution of EWMA Signals by Aerial Disturbance
Thinned Polygons
Control Chart Disturbance Severity Level
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
n=9
n=39
n=51
n=42
Clearcut
Heavy Thin
Light Thin
No Change
Aerial Image Interpretation


S 0.626299
R-Sq 73.1%
R-Sq(adj) 72.4%
Ground LAI - LICOR LAI-2000
NASA LAI - Feb. 18, 2011
0
1
2
3
4
1.0
1.5
2.0
2.5
3.0
3.5
4.0


S 0.548255
R-Sq 79.5%
R-Sq(adj) 79.0%
Ground LAI = - 1.640 + 0.4945 TM SR (SR)
Ground LAI - LICOR LAI-2000
Landsat 5 (SR) - Simple Ratio - Feb. 18, 2011
0
1
2
3
4
3
4
5
6
7
8
9
10
11
12


Mean LAI
2.0
1.5
1.0
0.5
0.0
1990
1995
2000
2005
2010
Year
Class
1
2
3
4
5



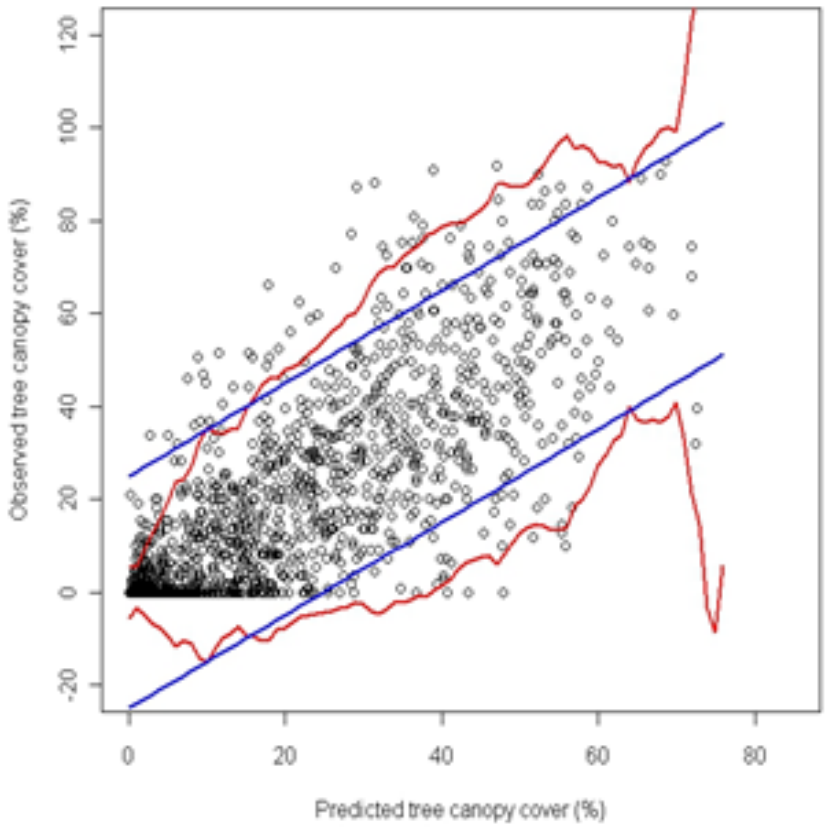


Figure 10 Example of Monte-Carlo 95% confidence intervals for a random forest model (red) as compared to standard bootstrap 95% confidence interval (blue) for percent tree canopy cover in a sparsely vegetated area of Utah. Note the standard bootstrap confidence intervals are too narrow in parts of the distribution and too wide in other parts of the distribution.